

# PATENT ABSTRACTS OF JAPAN

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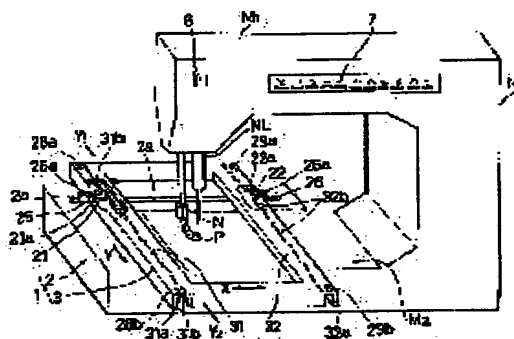
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## (54) EMBROIDERY DEVICE

### (57)Abstract:

**PURPOSE:** To provide a small-sized embroidery device which can be applied for the embroidery having a length in the Y direction.

**CONSTITUTION:** An embroidery frame shifting means for shifting a rectangular embroidery frame 3 is constituted of an X shifting means and Y shifting means, and the Y shifting means is constituted of the first and second racks 31b and 32b installed on a pair of opposed peripheral side parts of the embroidery frame, the first and second pinions 21 and 22 meshed with the first and second racks, and a turn driving means for turning the first and second pinions, and each pinion is shifted at the same time by an equal quantity in the X direction by the X shifting means. Further, the turn driving means is constituted of the first and second turn driving means, and a detecting means for detecting if the peripheral part of the embroidery frame coincides with the Y direction is installed, and the turn driving means is driven independently on the basis of the result in the detection, and the side part of the embroidery frame and the Y direction is allowed to coincide.



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CLAIMS

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[Claim(s)]

[Claim 1] The embroidery frame which holds the perimeter of the embroidery formation range of cloth in the flat condition, and the body of embroidery equipment which holds said embroidery frame horizontally along the bed side of the sewing machine which performs blind stitch formation actuation, In the embroidery equipment which was formed in said body of embroidery equipment, and was equipped with the embroidery frame migration means which carries out horizontal migration to the 2-way which intersects an embroidery frame perpendicularly, and the control means which makes said embroidery frame migration means drive according to the embroidery data set up beforehand Said embroidery frame migration means is equipped with an X migration means to move an embroidery frame in the direction of X, and Y migration means moved in the direction of Y which intersects perpendicularly with the direction of X. Y migration means The 1st and 2nd rack prepared in the side part of the couple in which an embroidery frame carries out phase opposite, and the 1st and 2nd pinion which gears on this 1st and 2nd rack, respectively, It is embroidery equipment of the sewing machine characterized by X migration means moving said each pinion in the direction of X while the revolution driving means which rotates this 1st and 2nd pinion constitutes.

[Claim 2] While the 1st revolution driving means which rotates the 1st pinion for a revolution driving means, and the 2nd revolution driving means which rotates the 2nd pinion constitute It is embroidery equipment of claim 1 account characterized by amending so that a detection means to detect whether the side part of an embroidery frame has agreed in the direction of Y may be established, each revolution driving means may be made for a control means to \*\* independently based on the detection result from said detection means and a side part and the direction of Y may agree.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the embroidery equipment which enabled it to install especially additionally the embroidery frame which supports cloth to a sewing machine to a domestic sewing machine etc. about the embroidery equipment to which made it make it move in the sewing-machine bed upper part.

[0002]

[Description of the Prior Art] The embroidery equipment made into \*\* which can realize embroidery sewing by installing additionally to current and a domestic sewing machine is proposed. Drawing 4 is drawing showing this conventional embroidery equipment E and domestic sewing machine M. Make it move to the 2-way (the direction of X, the direction of Y) which intersects perpendicularly the embroidery frame E2 of the sewing-machine bed M2 which supports Cloth W horizontally in the upper part according to the migration device contained in the body E1 of equipment, and the control unit contained by the body of equipment E1 grade performs this embroidery equipment E for that migration control fundamentally like a graphic display based on the embroidery data stored in the predetermined store.

[0003] Moreover, the thing to which made it make it move by driving the motor which prepared two belts over which it was built in the direction of X and the direction of Y corresponding to each belt as a migration device in which an embroidery frame E2 is moved in the direction of X and the direction of Y is used, it is erection within the limits of a belt, an embroidery frame E2 is moved, and various embroidery is given.

[0004]

[Problem(s) to be Solved by the Invention] However, if it was in the above-mentioned conventional embroidery equipment E, since the movable range of an embroidery frame E2 was restricted to erection within the limits of a belt, the erection range of a belt needed to be extended for expanding the range (this range being hereafter called the range which can be embroidered) which can embroider continuously, and there was a problem that the whole equipment was enlarged. For example, when embroidering the alphabetic character which continues in the direction of Y as shown in drawing 5, in order to enable it to perform this in one continuous sewing actuation, it is necessary to the back of a T-shirt or jumpering to also expand the erection range of a belt in the direction of Y with an embroidery frame. However, when the erection range of a belt is expanded, while also having to enlarge the body E1 of equipment in the direction of Y in connection with it and requiring many tooth spaces, the problem of becoming difficult arises and carrying will also become unsuitable as a domestic appliance.

[0005] For this reason, when embroidery in constituting conventional embroidery equipment E as a domestic appliance, as seldom expanded the range which can be embroidered but shown in drawing 5 using this was given, the embroidery range was divided for every character and performed. For this reason, the installation location of the cloth to an embroidery frame E2 had to be changed for every part, and it resulted in it being obliged to a complicated activity for a user.

[0006] This invention was made paying attention to the conventional trouble, it can respond easily by using the embroidery frame which suits that embroidery, and the body of equipment also aims [ invention ] the embroidery which has die length in the direction of Y at offer of the embroidery equipment which can be constituted very small.

[0007]

[Means for Solving the Problem] While this invention is equipped with the embroidery frame migration means to which horizontal migration of the embroidery frame of the rectangle holding cloth is carried out to the 2-way which intersects perpendicularly In the embroidery equipment which controlled actuation of said embroidery frame migration means by the control means according to the embroidery data set up beforehand said embroidery frame migration means An X migration means to move an embroidery frame in the direction of X, and Y migration means moved in the direction of Y which intersects perpendicularly with the direction of X constitute. Y migration means The 1st and 2nd rack prepared in the side part of the couple in which an embroidery frame carries out phase opposite, and the 1st and 2nd pinion which gears on this 1st and 2nd rack, respectively, While the revolution driving means which rotates this 1st and 2nd pinion is resembled and constituting more, it is made for X migration means to move said each pinion in the direction of X.

[0008] Moreover, while the 1st revolution driving means which rotates the 1st pinion for a revolution driving means, and the 2nd revolution driving means which rotates the 2nd pinion constitute A detection means to detect whether the side part and the direction of Y of an embroidery frame have agreed is established, and each revolution driving means is made to drive independently based on the detection result from said detection means, and you may make it amend by the control means, so that the side part and the direction of Y of an embroidery frame may agree.

[0009]

[Function] In this invention, since the rack currently formed in the side part of an embroidery frame has got into gear to both pinions, an embroidery frame can be moved to the direction of Y, and parallel by carrying out the tales-doses revolution of both the pinions simultaneously. Therefore, the range of the embroidery which can carry out sewing continuously can be changed free only by changing the magnitude of an embroidery frame, and does not need to enlarge the appearance of the body of embroidery equipment. Namely, that what is necessary is just to have the magnitude of extent which can contain the revolution driving means which rotates both pinions, the appearance of the body of embroidery equipment cannot require many installation tooth spaces, but can make them the easy small configuration for carrying.

[0010] Moreover, if it detects whether the side part and the direction of Y of an embroidery frame have agreed in the initial state before sewing initiation, each pinion is independently rotated based on the detection result and it is made to make the side part and the direction of Y of an embroidery frame agree, it will become easily possible about initial setting of an embroidery frame to carry out to accuracy.

[0011]

[Example] Hereafter, one example of this invention is explained based on drawing 1 thru/or drawing 3 . Drawing 1 is the appearance perspective view of this example, in drawing, M is a domestic sewing machine, while going up and down with a revolution of the sewing-machine main shaft outside drawing on that sewing-machine arm M1, the needle bar NL which carries out splash motion is formed in the longitudinal direction if needed, and the sewing needle N is being fixed to this needle bar NL. Moreover, cloth presser-foot P which sews and goes up and down synchronizing with rise-and-fall actuation of a needle is supported by the sewing-machine arm M1.

[0012] Moreover, 1 is embroidery equipment in this example. This embroidery equipment consists of a body 2 of exterior embroidery equipment (the body of equipment is only called below), and an embroidery frame 3 of the rectangle which is removable on this body 2 of embroidery equipment, and supports cloth on it at a level with the top face of the sewing-machine bed M2. While the side faces 31a and 32a crooked below are established, the side faces 31a and 32a are countered, and 1st rack 31b and 2nd rack 32b protrude on the side parts 31 and 32 of an embroidery frame 3. In addition, although there are various approaches as the fixed approach of the cloth to an embroidery frame 3, there is the approach

of pressing with an embroidery frame 3 and the frame (not shown) of isomorphism, and fixing etc. from the upper part about the cloth laid in the top face of an embroidery frame 3, for example.

[0013] Moreover, the body 2 of equipment can be crooked in the shape of L character, and can be installed now along the side face of the sewing-machine bed M2, and the top face is located on the same flat surface as the top face of the sewing-machine bed M2. Long slot 2a is formed in the top face of this body 2 of equipment along the direction of X, and the 1st and 2nd pinion 21 and 22 is being fixed to the rotation shafts 21a and 22a of the couple which projects upwards from this long slot 2a, respectively.

[0014] And each pinion may have comes to gear on each racks 31b and 32b of the embroidery frame 3 laid in the top face of the sewing-machine bed M2. Moreover, the rotation shafts 21a and 22a can carry out revolution actuation now independently respectively with the Y drive motor 23 (1st revolution driving means) and the Y drive motor 24 (2nd revolution driving means) which were contained in the body 2 of equipment, respectively. These Y drive motors 23 and 24 and the rotation shafts 21a and 22a are supported in the direction of X in the body 2 of equipment by the supporter material which is not illustrated [ which was contained movable ]. In addition, both the above-mentioned Y drive motors 23 and 24 constitute the revolution driving means, and these Y drive motors 23 and 24, and each above-mentioned pinion 21-22, and each rack 31b and 32b constitute Y migration means further.

[0015] 25 and 26 are the rotation rollers which countered said each pinions 21 and 22 and were supported rotatable, are in the condition of having meshed the racks 31b and 32b of an embroidery frame 3, and carry out the pressure welding of the pinions 21 and 22 to each side faces 31a and 32a of an embroidery frame 3 elastically. In addition, the pivots 25a and 26a of each of said rotation rollers 25 and 26 are supported by the supporter material which supports said rotation shafts 21a and 22a. By moving this supporter material with the X drive motor 27 (referring to drawing 2 ) as an X migration means contained in the body 2 of equipment, the rotation rollers 25 and 26 move in the direction of X with the 1st and 2nd pinions 21 and 22 and Y drive motors 23 and 24.

[0016] Moreover, 28a, 28b, 29a, and 29b which were prepared regardless of the direction which sets an embroidery frame 3 since it was usable are a reflecting plate which reflects light, are stuck on the end section underside of the side parts 31 and 32 of an embroidery frame 3, and are arranged in the shape of [ which intersects perpendicularly with the longitudinal direction of each side parts 31 and 32 ] same straight line.

[0017] On the other hand, drawing 2 is the block diagram showing the control means in this example. In drawing, 5 is a well-known microcomputer (control means) which consists of CPU5a, ROM5b, and RAM5c. The start/stop switch 6 which orders it actuation/halt of a sewing machine M, a pattern [ that an embroidery pattern is chosen ] selecting switch 7, two photosensors 8a and 8b (the body 2 of equipment near the pinions 21 and 22 of drawing 1 is equipped), etc. are connected to the input side of CPU5a. When an embroidery frame 3 is in accuracy in an initial position, these photosensors detect the reflected light from each above-mentioned reflecting plates 28a, 28b, 29a, and 29b, and send out the detecting signal to CPU5a. In addition, optical sensor 8a detects reflecting plates 28a or 28b, photosensor 8b detects reflecting plates 29b or 29b, respectively, and the detection means is constituted by the above optical sensor and reflecting plate.

[0018] Moreover, the Y drive motors 23 and 24 including the sewing-machine motor MM made to rotate a sewing-machine main shaft and X drive-motor 27 grade are connected to the output side of CPU5a through the actuation circuit MMa, and 23a, 24a and 27a, respectively. In addition, in drawing 2 , what was surrounded with the broken line is built in the sewing machine M, and the other thing is built in the body 2 of equipment of embroidery equipment 1. Namely, in this example, the microcomputer 5 which performs actuation control of a sewing machine M can also perform actuation control of embroidery equipment 1, and the connector outside drawing established in both equipments can perform now suitably electrical installation of embroidery equipment 1 and a sewing machine M.

[0019] Based on the above configuration, an operation is explained below. In forming the usual seams, such as a straight stitch, embroidery equipment 1 is removed from a sewing machine M, and cloth is laid on the sewing-machine bed M2, and by a well-known feed dog etc., cloth is conveyed and it performs sewing actuation. On the other hand, in performing embroidery sewing, the embroidery frame of the

magnitude which can surround the range (embroidery range) which installs the body 2 of equipment of embroidery equipment 1 in the side of the sewing-machine bed M2, next embroiders continuously first is chosen, and it equips the body 2 of equipment with this. Wearing of this embroidery frame 3 can be easily performed by meshing those racks 31b and 32b to pinions 21 and 22. In addition, in the side face of the embroidery frame 3 with which it was equipped, in order that the rotation rollers 25 and 26 might carry out a pressure welding, the engagement condition of pinions 21 and 22 and Racks 31b and 32b should be stabilized.

[0020] Here, cloth is fixed to the top face of an embroidery frame 3, and if a sewing actuation initiation command is inputted with the start/stop switch 6 after choosing a pattern that it should embroider with a selecting switch 7, initial position setting-operation of an embroidery frame 3 will be performed first. That is, although it is required to set an embroidery frame 3 as a proper location at the time of sewing actuation initiation in order to proper embroider [ of cloth ], the embroidery frame 3 carried by the user is not necessarily in an initial position. for example, the condition that the embroidery frame 3 inclined to the direction of Y by the path clearance between the 1st and 2nd pinion 21 and 22 and the 1st and 2nd rack 31b and 32b etc. as were shown in drawing 3 (a), and the embroidery frame 3 had shifted in the direction of Y from the initial position (the alternate long and short dash line in drawing shows) or it was shown in this drawing (b) -- wearing \*\*\*\* -- there are also things. For this reason, in advance of sewing actuation initiation, CPU5a performs the following initial position setting-out motion control.

[0021] That is, sewing actuation will be started, if a sewing actuation initiation command is inputted, it judges whether CPU5a has whether the detecting signal is first outputted from both photosensors 8a and 8b, and an embroidery frame 3 in an initial position and the output signal is sent out from both photosensors.

[0022] Moreover, if the detecting signal is not outputted from both photosensors, it judges that it is in the condition shown in drawing 3 (b), two Y drive motors 23 and 24 are operated until a detecting signal is outputted from at least one photosensors 8a or 8b among photosensors 8a and 8b, the tales-doses revolution of both the pinions 21 and 22 is carried out simultaneously, and the parallel displacement of the embroidery frame 3 is carried out in the Y1 direction. And if a detecting signal is outputted from at least one photosensor, based on the detecting signal, actuation of one of the two's Y drive motor will be suspended. The motor by the side of the sensor which is not detected is driven until a sensor detects.

[0023] Here, when the detecting signal is outputted from both photosensors, a judgment that the embroidery frame 3 is located in an initial position at accuracy is made, and sewing actuation is started. Moreover, when the detecting signal is outputted only from one photosensor, one of Y drive motors is slightly rotated to forward reverse both directions. Thereby, an embroidery frame 3 carries out a revolution splash in the predetermined range from the location shown in drawing 3 (b). And if a detecting signal is outputted by this revolution also from the photosensor of the group of another side, CPU5a will make a judgment that actuation of Y drive motor is suspended and the embroidery frame 3 is located in an initial position at accuracy, and will start sewing actuation.

[0024] as mentioned above, since an embroidery frame can be automatically set as an initial position even if a user sets an embroidery frame as what kind of location of the body 2 of equipment in this example, efficiently, a sewing activity can be boiled and can be performed. In addition, setting out of the initial position in the direction of X is performed by the X drive motor 27 at the time of before sewing actuation termination, and there is no line crack at the time of sewing actuation initiation. Moreover, in sewing actuation, read the embroidery data chosen by the encaustic selecting switch 7 from ROM5b, and the Y drive motors 23 and 24 and the X drive motor 27 are made to drive according to the embroidery data, and CPU5a moves an embroidery frame 3 to X and Y both directions, it forms a predetermined pattern and goes. In addition, in order that sewing working and both the pinions 21 and 22 may carry out a tales-doses revolution simultaneously with both the Y drive motors 23 and 24, an embroidery frame 3 performs a parallel displacement.

[0025] Thus, since migration in the direction of Y of an embroidery frame 3 is performed by the revolution of both the pinions 21 and 22, even if the embroidery range in the direction of Y is big, it can respond. That is, since it can consider as the small thing equipped with few tooth spaces which can

contain Y drive motor etc., the embroidery range in the direction of Y is not restricted by the dimension configuration of the body 2 of equipment.

[0026] In addition, although the reflecting plates 28a, 28b, 29a, and 29b of four sheets and two photosensors 8a and 8b were made to perform a detection means to detect whether the side parts 31 and 32 of an embroidery frame 3 lean to the direction of Y in the above-mentioned example. The number of photosensors is good also as four or more pieces, and can also detect an inclination using two pieces or three photosensors depending on a detection location.

[0027] Furthermore, it is also possible to constitute a detection means using sensors other than a photosensor. For example, it is also possible to change to reflecting plates 28a, 28b, 29a, and 29b, to prepare the magnetic substance, and to detect this magnetic substance by the porcelain induction component. Furthermore, although the above-mentioned example showed the case where the microcomputer 5 built in the sewing machine M as a control means of embroidery equipment 1 was used, it is also possible for the control means of a microcomputer etc. to be built in embroidery equipment 1 the very thing, and for it to be made to control embroidery equipment by this. Since control units, such as a microcomputer, can be contained to very few tooth spaces, the body of equipment does not enlarge them by building this in, and they can expect the same effectiveness. Thus, especially this invention is not limited to the above-mentioned example, and that embodiment can be suitably changed into a claim at technical within the limits of a publication.

[0028]

[Effect of the Invention] The embroidery equipment concerning this invention can expand the embroidery range in the direction of Y free, without expanding the dimension configuration of the body of equipment, in order to perform migration in the direction of Y of an embroidery frame by preparing a pinion in the body of equipment and rotating this pinion, while forming the rack in the side part of the couple in which an embroidery frame carries out phase opposite as explained above. For this reason, it can consider as a configuration at the easy small dimension configuration for haulage, and the suitable thing for a domestic sewing machine etc. can be offered. Moreover, a detection means to detect the inclination in the direction of Y of an embroidery frame is established, if one of driving means is made to drive based on the detection result of a detection means and the inclination of an embroidery frame is amended at the time of initial position setting out of an embroidery frame, the initial position setting-out activity of an embroidery frame can be done easily, and good workability can be acquired.

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[Translation done.]



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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing one example of this invention.

[Drawing 2] It is the block diagram showing the control means in this example.

[Drawing 3] The explanation top view showing an example of the condition at the time of embroidery frame wearing [ in / in (a) / this example ] and (b) are top views in which an embroidery frame shows the condition of having inclined to the direction of Y.

[Drawing 4] It is the perspective view showing conventional embroidery equipment.

[Drawing 5] It is the front view showing an example of the embroidery formed in a T-shirt, jumpering, etc.

[Description of Notations]

2 Body of Equipment

3 Embroidery Frame

31b The 1st rack

32b The 2nd rack

21 1st Pinion

22 2nd Pinion

23 Y Drive Motor (1st Revolution Driving Means)

24 Y Drive Motor (2nd Revolution Driving Means)

27 X Drive Motor (X Migration Means)

5 Microcomputer (Control Means)

8a Photosensor

8b Photosensor

28a Reflecting plate

28b Reflecting plate

29a Reflecting plate

29b Reflecting plate

M Domestic sewing machine

M1 Sewing-machine arm

M2 Sewing-machine bed

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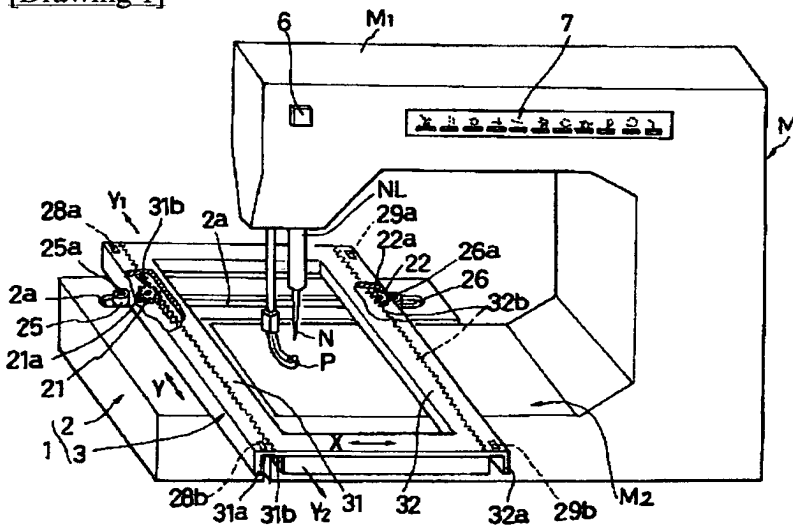
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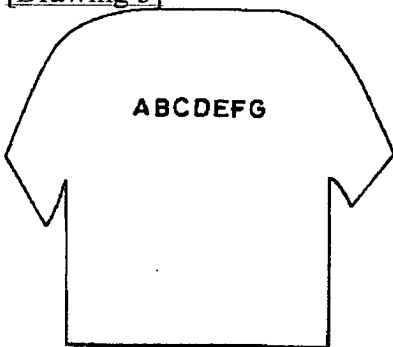
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## DRAWINGS

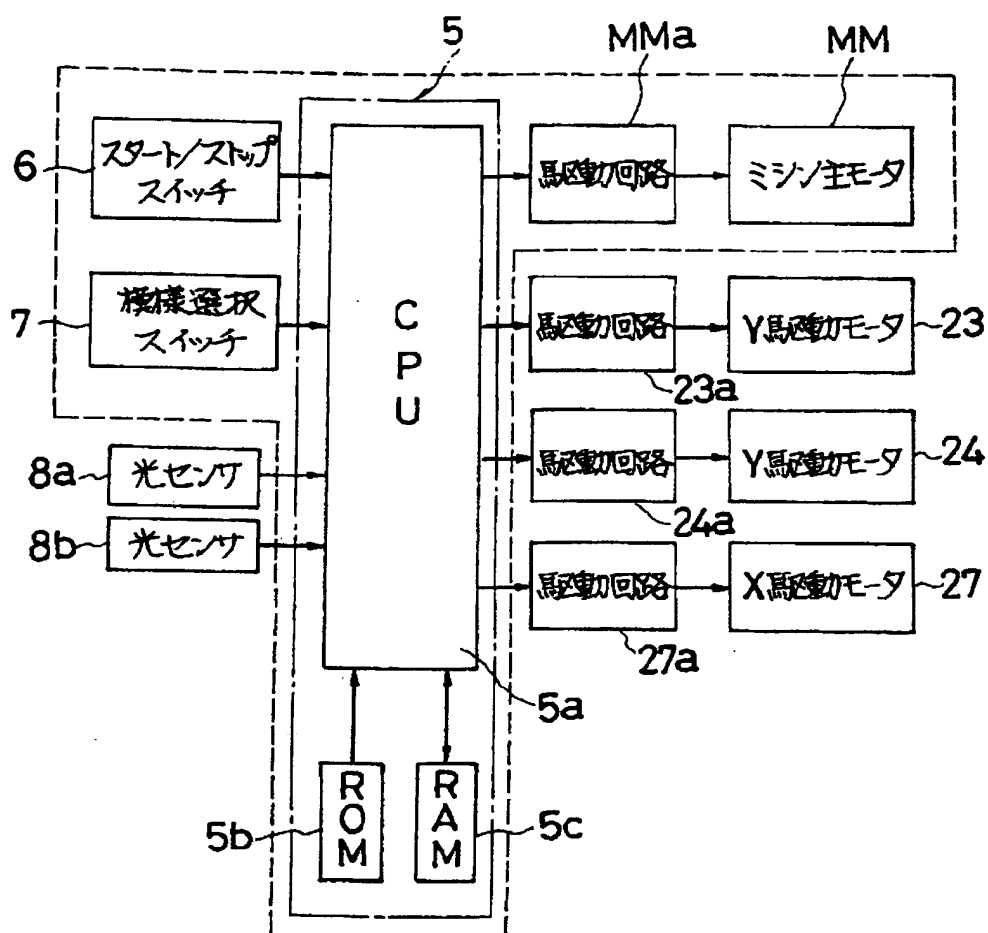
[Drawing 1]



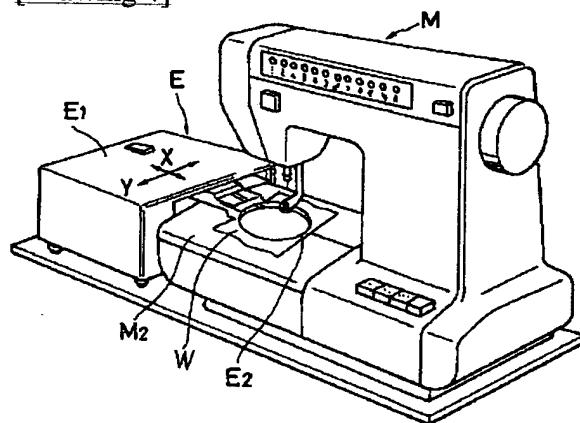
[Drawing 5]



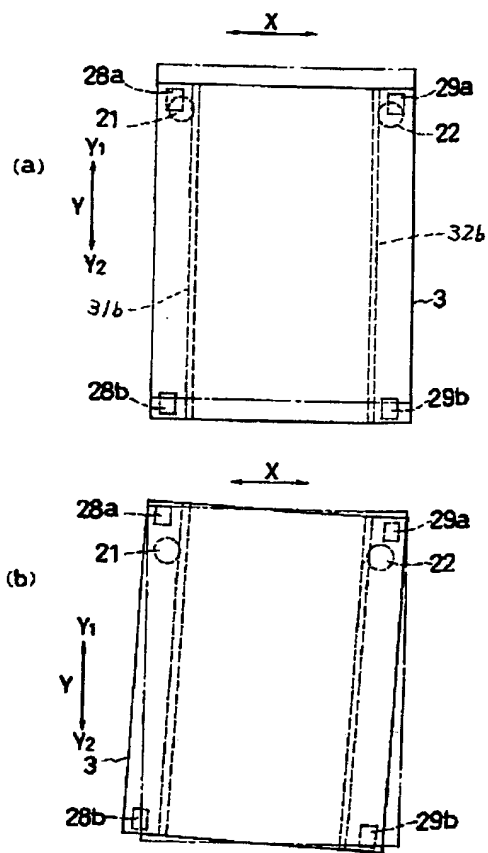
[Drawing 2]



[Drawing 4]



[Drawing 3]



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[Translation done.]